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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,794	08/08/2006	Hironori Kumagai	10873.1941USWO	6450

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EXAMINER	
OSINSKI, MICHAEL S	

ART UNIT	PAPER NUMBER
2622	

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12/16/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/597,794	KUMAGAI ET AL.	
	Examiner	Art Unit	
	MICHAEL OSINSKI	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _24 September 2009_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,5 and 7-9_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1, 5, and 7-9_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _24 September 2009_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/24/2009 has been entered. Claims 1, 5, and 7-9 are pending in this application.

Drawings

2. The objections to the drawings are withdrawn in response to amended drawings filed on 9/24/2009.

Response to Arguments

3. The Applicant's arguments with regards to the claims have been fully considered but are moot in view of the new ground(s) of rejection.

Claim Rejections – 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. ***Claims 1 and 5 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] in view of Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA] and Tamamura (US Patent 7,463,284) [hereafter Tamamura] filed on 11/15/2005.***

6. As to claim 1, Nonaka teaches a multi-eye imaging apparatus (Fig. 1) that comprises a plurality of imaging systems comprising optical systems (11and 16) and imaging elements (12 and 17) that have different optical axes, wherein the imaging systems include a first imaging system (11, 12, and 21) having pixel shifting means of an actuator (21) for changing a relative positional relationship between an image of a subject (110) formed on the imaging element (12) and the imaging element, and a second imaging system (16 and 17) in which a relative positional relationship between an image of a subject (110) formed on the imaging element (17) and the imaging element is fixed during time-series image capture (Col. 3, 29-53, Col. 4, 47-59).

Additionally, Nonaka discloses a recording section (15) for storing images imaged by the first imaging system at the end of an exposure period (Col. 3, 59-65) and an image memory (19a) for accumulating a plurality of frames of image information captured in time series (Fig. 2, I0, I1) during an exposure period wherein the memory is contained within a camera shake detection section (19) that compares the plurality of frames of image information accumulated in the image memory section with a comparison section (19b), moving direction calculation section (19c), and a moving amount calculation section (19d), and an image processing/forming section (22) that

synthesizes the image signals contained within the image memory sections upon one another (Fig. 5, 24b), corresponding to combining the plurality of frames of images accumulated in the image memory (Col. 4, 9-46, Col. 6, 26-34). Furthermore, Nonaka discloses a calculation control section (25) that calculates a magnitude of a parallax from images captured by the various imaging systems (Col. 7, 63-67, Col. 8, 1-6) and that the shake amount detection section (19), corresponding to the shake amount obtaining means, is able to obtain the shake amount after image captured is performed by changing the position of the first imaging system (11, 12, and 21) in time series is completed (Col. 11, 66-67, Col. 12, 1-3, 17-42, the process shown in Figure 15 is a modification of the process carried out after step S15 in Figure 3 which takes place after image capture is completed (taking place in S10-S14 in Fig. 3) using the first imaging system where within the process of Figure 15, the shake amount detection section obtains the shake amount and supplies the shake amount to a calculation control section 25 that forms image data using the image recorded image by the first imaging system obtained by varying the position of the imaging system during the imaging process (S5-S8 of Fig. 3) and the shake amount detected by the shake detection section after the image capturing operations are completed).

It is however noted that Nonaka fails to disclose combining images after pixels are shifted relative to each other so the resolution of the combined image is higher than that of the plurality of frames of images wherein a change amount of the positional relationship by the pixel shift means is fixed and an optimal image selecting means for selecting image information which is used in the combination of the image combining

means, from image information captured by the first imaging system and image information captured by the second imaging system that are accumulated in an image memory, based on the shake amount obtained by shake amount obtaining means and parallax amount obtained by parallax amount obtaining means..

On the other hand, AAPA discloses a technique called "pixel shift" (Fig. 20A-20C) for improving the resolution of an imaging apparatus. The technique involves shifting (Fig. 20B) the active region (2101) of an imaging element (P) to a different position relative to an initial position (Fig. 20A) in order to pick-up additional image data of a scene not originally captured by the imaging element, wherein the pixels of the imaging element are shifted by 1/2 of a pixel in both the horizontal and vertical directions (Fig. 20B) (Page 1, 0010). The images captured (pre-shift and post-shift) are combined and result in an image whose resolution is equivalent to an image captured using an imaging element that is doubled in size (Page 1, 0009-0012).

Additionally, Tamamura teaches a camera (Fig. 1) that combines multiple captured images using an image composition unit (117) to form an enhanced image free from image blur due to camera shake. A plurality of images are captured by an image sensing unit (15) during an exposure time divided into a plurality of short exposure periods and processed by an image processor (112) and afterwards feature points of the image are extracted by a shift detector (113) and the coordinates of the extracted feature points are determined by a coordinate converter (114), the coordinates determining shift amounts between images. The processed images of the exposure periods are stored within an image storage unit (115) and combinations of

stored images are selected by a selector (116) and subsequently combined by the image composition unit. The size of the image comprising the combination of two previously stored images is calculated by an image size unit (118) and the calculated sizes for the synthesized images are compared by a comparator (120) that selects a synthesized image having the greatest size, corresponding to the least amount of shake between the two images, and outputs the image with the least amount of shake to recording and display units (122 and 121) (Col. 3, 13-18, 57-67, Col. 4, 1-41).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a comparator to select image information sensed and captured during an exposure period of the camera and subsequently stored within a memory section to be used in a selected combination of image signals based on a detected amount of variation between images as taught by Tamamura and to incorporate combining images after pixels are shifted by a fixed amount relative to each other so the resolution of the combined image is increased as disclosed by AAPA to increase the resolution of the multi-eye imaging apparatus equipped with a pixel shifting means and image combining means of Nonaka because the prior art are directed towards imaging devices containing movable imaging elements used for capturing images of a scene and because the technique of combining images after pixels have been shifted a particular fixed amount in order to increase a resolution of an imaging element was recognized and identified by AAPA as part of the ordinary capabilities of one skilled in the art that would yield predictable a result of increasing the resolution of images captured by the multi-eye imaging apparatus to a resolution higher than that of the

plurality of image frames that are synthesized by the image processing/forming section (22) of Nonaka and the comparator would allow the device of Nonaka to select specific stored image information representative of an exposure period, such as those in the memory sections of the shake obtaining section 19 and the recording section 15, for combination with each other to produce an image with increased resolution through the synthesizing of the images, performed by the forming section 22, that is also free from blurring effects caused by camera shake based on the amount of shake detected by the shake detecting section and incorporating the parallax amount into the decision as to which combination of stored images are to be used would allow the device of Nonaka to choose the respective images for combination by taking into account the distance between images formed on the various image sensors increasing the accuracy of the selection of images best suited for combination.

7. As to claim 5, the Nonaka, AAPA, and Tamamura references disclose all claimed subject matter with regards to the comments of claim 1.

8. ***Claims 7-8 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA] and Tamamura (US Patent 7,463,284) [hereafter Tamamura] filed on 11/15/2005, as applied to claim 1, in further view of Nakazono (Japanese Patent Publication 2003-134385) [hereafter Nakazono] published on 5/9/2003.***

9. As to claim 7, it is noted that Nonaka, AAPA and Tamamura fail to disclose means for discriminating different subjects wherein the shake amount obtaining means obtains a shake amount for each of the different subjects and the image combining means combines images for each of the different subjects.

On the other hand, Nakazono teaches a camera (Fig. 1) that captures an image using a CCD imager (1) and using an image composition device (4) that comprises a motion vector detecting element (Fig. 2, 11, Fig. 3) that uses two pictures to discriminate subject images (Fig. 5) and determines a shake amount for the subject using a motion vector calculation part (Fig. 3, 23) and the two images used to determine a shake amount of the subject of the image are combined (Fig. 15) into an output image using a synthesizing means (Fig. 14, 92) (Page 11, 0056-0058, Page 12, 0059-0060, Page 16, 0073-0075).

It would have been obvious to one having ordinary skill in the art at the time of invention to discriminate subjects of an image and obtain shaking amounts of the identified subjects as taught by Nakazono with the multi-eye imaging apparatus of Nonaka, modified with the teachings of AAPA and Tamamura, because the prior art are directed towards imaging devices that eliminate image shaking effects and because obtaining shake amounts, or movement amounts, of an imaged subject between two images would allow the device of Nonaka to determine an image shake amount for an image's subject as opposed to the entire image in order to compensate for an image

where the subject itself is moving as opposed to the physical camera, resulting in an image free from shaking or blurring effects.

10. As to claim 8, the Nakazono reference discloses all claimed subject matter with regards to similar comments of claim 7. Additionally, Nakazono teaches dividing image information into a plurality of blocks (Fig. 8) and obtaining a shake amount for a plurality of blocks using block setting means (Fig. 3, 22) (Page 13, 0064-0065).

11. ***Claim 9 is rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA] and Tamamura (US Patent 7,463,284) [hereafter Tamamura] filed on 11/15/2005, as applied to claim 1, in view of Yu et al. (US Patent 6,611,289) [hereafter Yu] published on 8/26/2003.***

12. As to claim 9, Nonaka teaches the optical photographing lens (11) forms a main image of a subject (110) onto an image sensor (12), which captures all incident light and corresponding colors, and that light receiving lens (16) receives reflected luminous flux from the subject and an image sensor (17), which also captures all incident light and corresponding colors, is used to form images based on the reflected luminous flux and subsequently these images are used to determine moving direction of the image sensor (12) (Col. 3, 42-53, 66-67, Col. 4, 1-8, 20-28).

It is however noted that Nonaka, AAPA, and Tamamura fail to disclose an imaging system for handling a red color, an imaging system for handling a green color, and an imaging system for handling a blue color, wherein, for at least one corresponding to one color of the imaging systems corresponding to the respective colors, the number of the imaging systems corresponding to the one color is two or more.

On the other hand, Yu teaches a camera (Fig. 3) with a plurality of imaging systems having different optical axes that are composed of an imaging system comprising of a lens (310) and an image sensor (302) for handling a red color, a lens (312) and an image sensor (304) for handling a green color, a lens (314) and an image sensor (306) for handling a blue color, and a lens (316) and an image sensor (308) for handling all colors of the visible light spectrum including the colors of the other imaging systems (Col. 4, 62-67, Col. 5, 1-39, 65-66, Col. 8, 59-61).

It would have been obvious to one having ordinary skill in the art at the time of invention to include separate and distinct imaging systems that each image a different RGB color and form a high-quality image and additionally include an imaging system that also images each of the RGB colors within a camera as taught by Yu with the multi-eye imaging apparatus of Nonaka, modified with the teachings of AAPA and Tamamura, because the prior art are directed towards imaging devices that include multiple imaging systems for imaging a single object and because such a camera configuration would allow the device of Nonaka to produce true color images with enhanced resolutions that are free from image/camera shake effects by using the RGB color imaging systems of

Yu as the multi-eye imaging systems (main system 11 and 12, sub-sampling system 16 and 17) within the configuration of Nonaka to detect camera shake and subsequently calculate movement amounts for the monochrome and multicolor image sensors incorporated within the respective imaging systems.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Osinski whose telephone number is (571) 270-3949. The examiner can normally be reached on Monday to Thursday 9 a.m. to 6 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Jason Chan/

Supervisory Patent Examiner, Art Unit 2622